



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/732,240	12/07/2000	Thomas George Ference	BUR919990304US1	9501
30400	7590	09/21/2004	EXAMINER	
HESLIN ROTHENBERG FARLEY & MESITI P.C.			CHU, CHRIS C	
5 COLUMBIA CIRCLE			ART UNIT	
ALBANY, NY 12203			PAPER NUMBER	

2815

DATE MAILED: 09/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/732,240

Applicant(s)

ERENCE ET AL.

Examiner

Chris C. Chu

Art Unit

2815

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 June 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1 - 7, 10 - 14 and 30 - 35 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1 - 7, 10 - 14 and 34 is/are allowed.
- 6) ☒ Claim(s) 30 - 33 and 35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application (PTO-152)
- ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Applicant's amendment filed on June 28, 2004 has been received and entered in the case.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 30 and 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Downes '277.

Regarding claim 30, Downes discloses in e.g., Fig. 1, Figs. 4, column 7, lines 38 - 49 and column 8, lines 10 - 31 a structure comprising:

- a first substrate (10) having a main surface with first solder bumps (14) and second solder bumps (16) separately disposed thereacross; and
- wherein the second solder bumps have at least a portion that melts at a lower temperature than the first solder bumps,

Art Unit: 2815

- the second solder bumps comprising alignment solder bumps (inherent function of any solder bumps) which when melted align the first substrate (10) to a second substrate (20) before melting the first solder bumps.

Furthermore, the limitation --“the second solder bumps comprising alignment solder bumps which when melted align the first substrate to a second substrate before melting the first solder bumps.”-- sets forth an intended use of the invention, but does not require that the first solder bumps actually be melted. The low-temperature bumps (16) of Downes inherently align the substrates upon reflow. See e.g., page 10, second paragraph of Applicant’s specification acknowledging that the reflow process inherently causes alignment.

Regarding claim 35, Downes discloses in e.g., Fig. 1, Figs. 4, column 7, lines 38 - 49 and column 8, lines 10 - 31 the second solder bumps (16) having a uniform composition and melting at a lower temperature than the first solder bumps (14).

4. Claims 30 – 33 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Koiwa et al. (U. S. Pat. No. 5,907,187).

Regarding claim 30, Koiwa et al. discloses in e.g., Fig. 3, Fig. 4 and column 11, lines 14 – 35 a structure comprising:

- a first substrate (1) having a main surface with first solder bumps (6b; column 11, lines 16 - 17) and second solder bumps (6a; column 11, lines 14 -15) separately disposed thereacross; and
- wherein the second solder bumps have at least a portion that melts at a lower temperature than the first solder bumps,

Art Unit: 2815

- the second solder bumps comprising alignment solder bumps (inherent function of any solder bumps) which when melted align the first substrate (1) to a second substrate (7) before melting the first solder bumps.

Furthermore, the limitation --“the second solder bumps comprising alignment solder bumps which when melted align the first substrate to a second substrate before melting the first solder bumps.”-- sets forth an intended use of the invention, but does not require that the first solder bumps actually be melted. The low-temperature bumps (6a) of Koiwa et al. inherently align the substrates upon reflow. See e.g., page 10, second paragraph of Applicant’s specification acknowledging that the reflow process inherently causes alignment.

Regarding claim 31, Koiwa et al. shows in e.g., Fig. 4 the second solder bumps (6a) are melted on the pads (4) and the first solder bumps (6b) are not melted on the pad. The attaching area of the second solder bumps (6a) adjacent to the pads (4) is bigger than the attaching area of the first solder bumps (6b) adjacent to the pads (4). Thus, Koiwa et al. discloses the second solder bumps (6a) being larger than the first solder bumps.

Regarding claim 32, Koiwa et al. discloses in e.g., Fig. 4 and column 11, lines 27 – 32 the second solder bumps (6a; Sn 63% - Pb 37%, melting point about 180 °C) melting at a temperature at least 25 °C less than the first solder bumps (6b; Sn 10% - Pb 90%, melting point about 310 °C).

Regarding claim 33, Koiwa et al. discloses in e.g., Fig. 4 the first substrate (1) comprising a first semiconductor chip (11).

Regarding claim 35, Koiwa et al. discloses in e.g., Fig. 4 and column 11, lines 27 – 32 the second solder bumps (6a; Sn 63% - Pb 37%, melting point about 180 °C having

Art Unit: 2815

a uniform composition and melting at a lower temperature than the first solder bumps (6b; Sn 10% - Pb 90%, melting point about 310 °C).

Allowable Subject Matter

5. Claims 1 – 7, 10 – 14 and 34 are allowed.
6. The prior art of record (Downes U. S. Pat. No. 6,222,277 & Koiwa et al. U. S. Pat. No. 5,907,187) teaches two groups of solder bumps that have two different temperatures and one group of solder bumps is reflowed solder bumps. However, the prior art of record does not teach or reasonably suggest, either singularly or in combination with all the language recited in amended claim filed on June 28, 2004 by applicant, at least first and second solder bumps being reflowed solder bumps. Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled “Comments on Statement of Reasons for Allowance.”

Response to Arguments

7. Applicant's arguments filed on June 28, 2004 have been fully considered but they are either moot in light of the new grounds of rejection or are not persuasive.

Applicant argues “applicants respectfully submit that Downes does not teach or suggest this functionality. As noted above, the first plurality of solder balls 40 in Downes are not to be reflowed (contrary to applicants’ recited structures).” This argument is not

Art Unit: 2815

persuasive. As explained in the previous paragraph, since Downes's solder bumps are solder bumps that has a function of alignment, Downes teaches the functionality of aligning the first solder bumps between the first substrate and the second substrate before the first solder bumps are melted.

For the above reasons, the rejection is maintained.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

- (a) Dockerty et al. (U.S. Pat. No. 5,796,169) discloses in e.g., column 3, lines 27 – 37 a solder (Sn 63% - Pb 37%) has a melting point about 180 °C and a solder (Sn 10% - Pb 90%) has a melting point about 310 °C.
- (b) Kumazawa et al. discloses two different groups of solder bumps, each one of the groups has a different melting points.

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

Art Unit: 2815

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chris C. Chu whose telephone number is 571-272-1724. The examiner can normally be reached on 11:30 - 8:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on 517-272-1664. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Chris C. Chu
Examiner
Art Unit 2815

c.c.
September 20, 2004


GEORGE ECKERT
PRIMARY EXAMINER